

# The Chemical Age

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(See page 245)

*"Fluor acid air is procured by dissolving the earthy substance called fluor in vitriolic acid.*

*This kind of air extinguishes a candle and, like vitriolic air, one measure of it saturates two of alkaline air. It is peculiar to this kind of air to dissolve glass when it is hot.*

*It seems to consist of a peculiar acid vapour, united to the strong substance of the fluor; for water being admitted to it absorbs the acid vapour, and the stony substance is deposited. By this means it exhibits an amusing appearance, whether water be admitted to a glass jar previously filled with that air, or the bubbles of air be admitted, as they are formed, to a quantity of water resting on mercury."*



## ... an amusing appearance

So, in 1797, Joseph Priestley described his early observations on hydrofluoric acid to students at the New College in Hackney, and recorded them under the title of *Heads of Lectures on a Course of Experimental Philosophy*. Today, using fluor acid air dissolved in aqua destillata, and costly vessels of silver and platinum, B.D.H. chemists make vast quantities of

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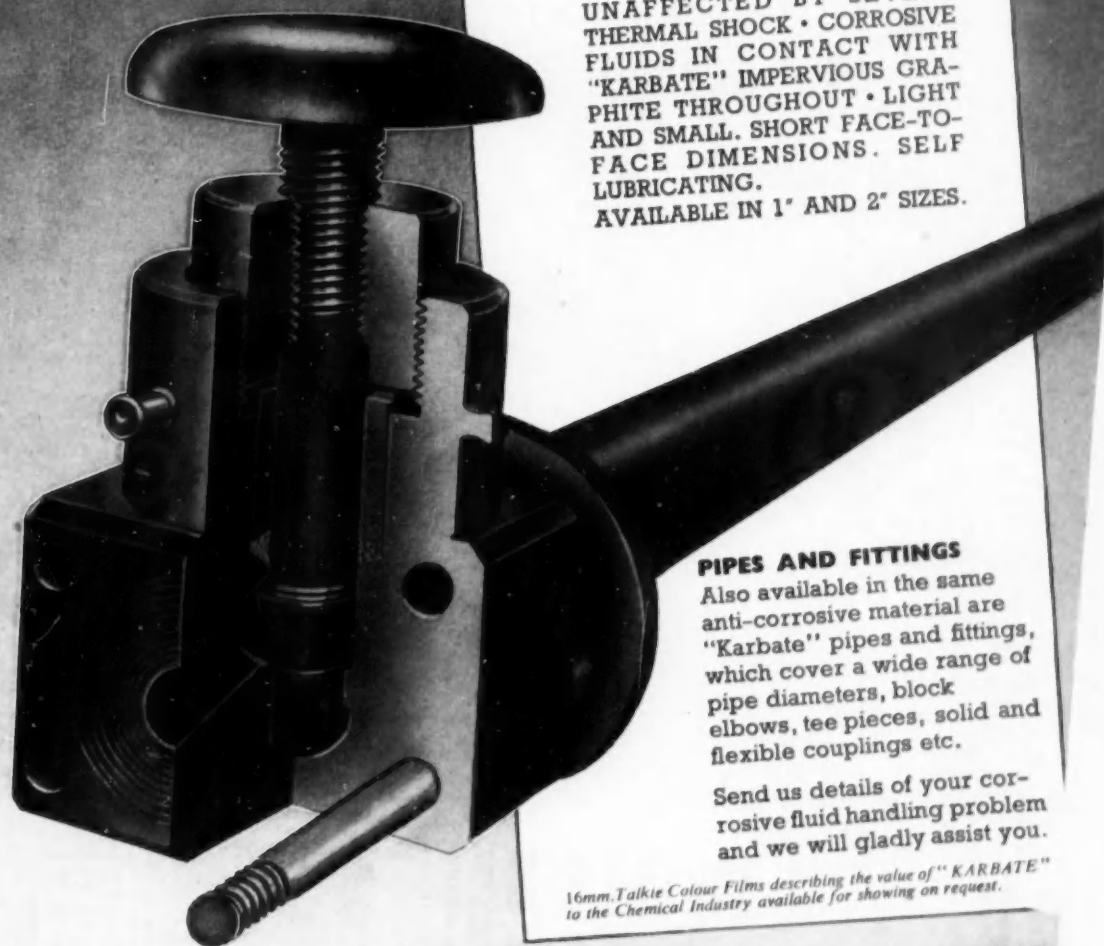
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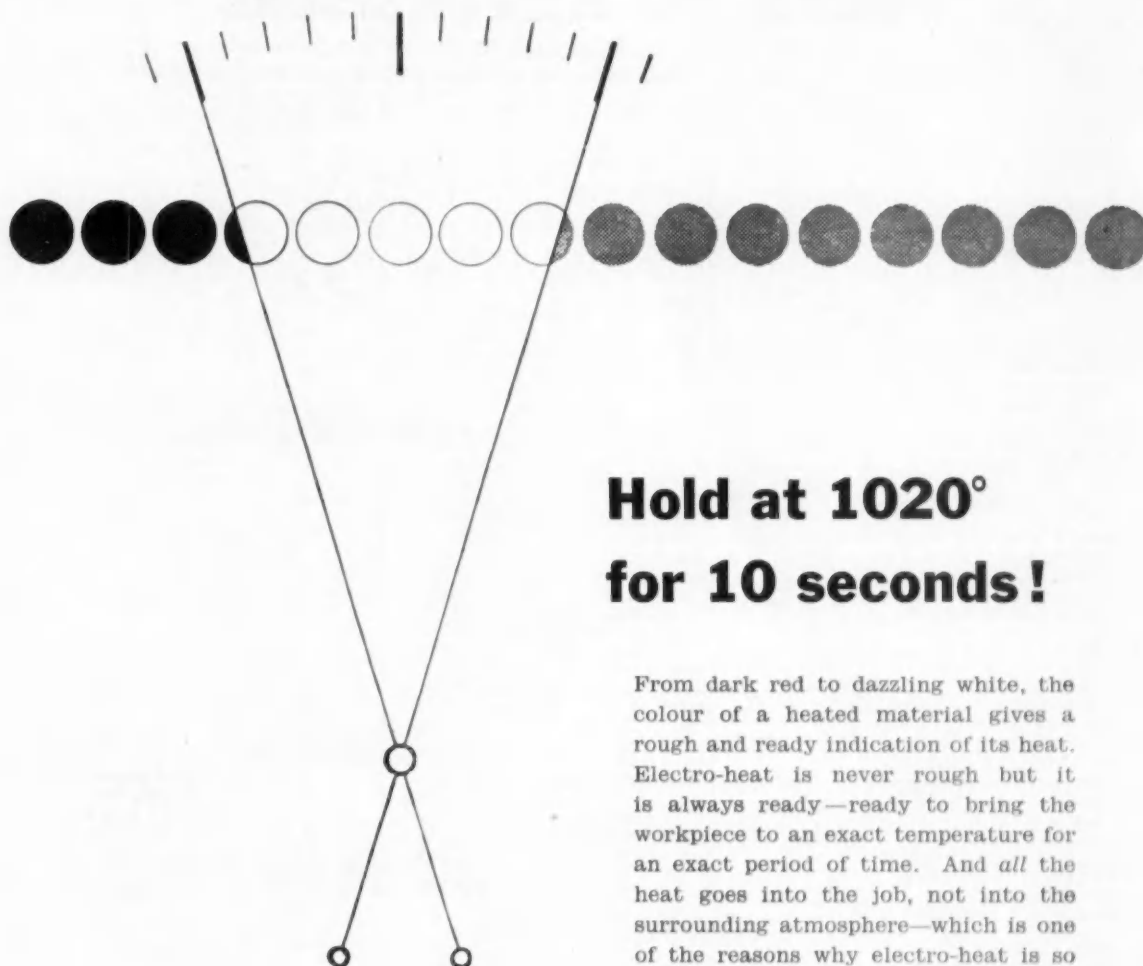
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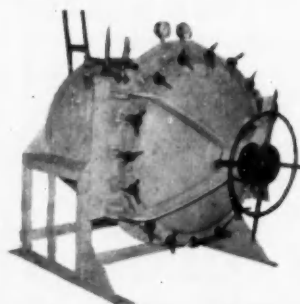
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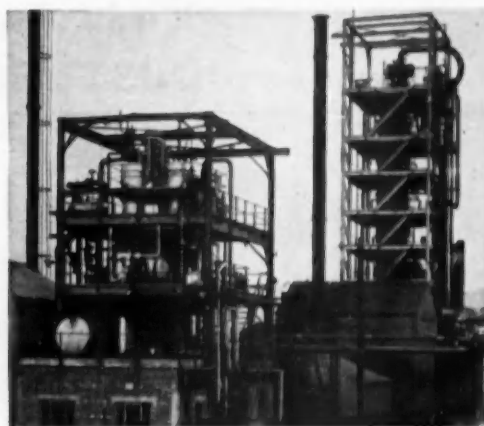
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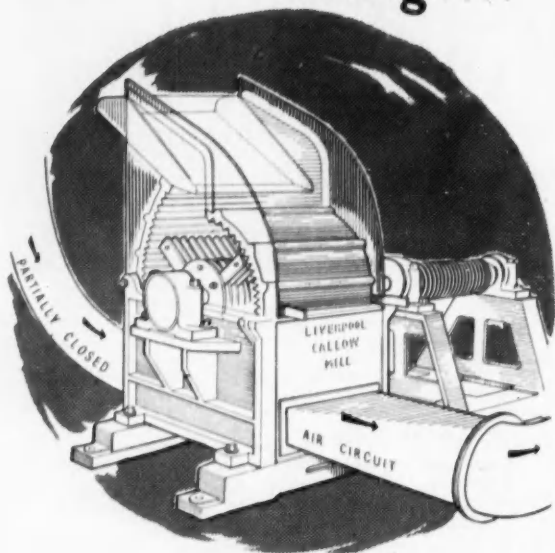
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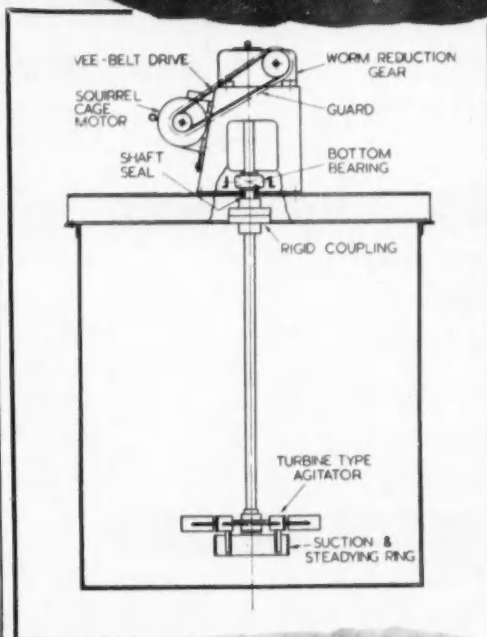
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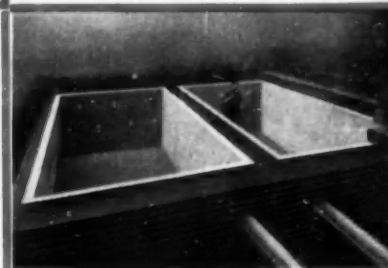
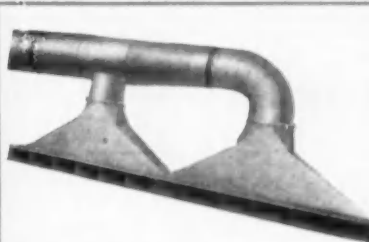
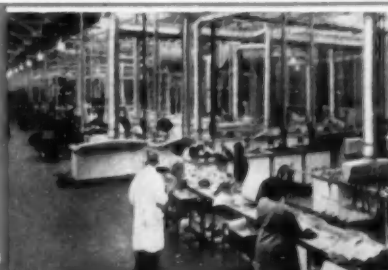
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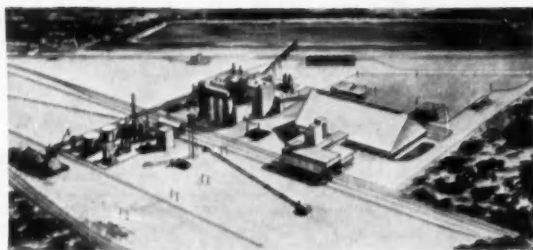
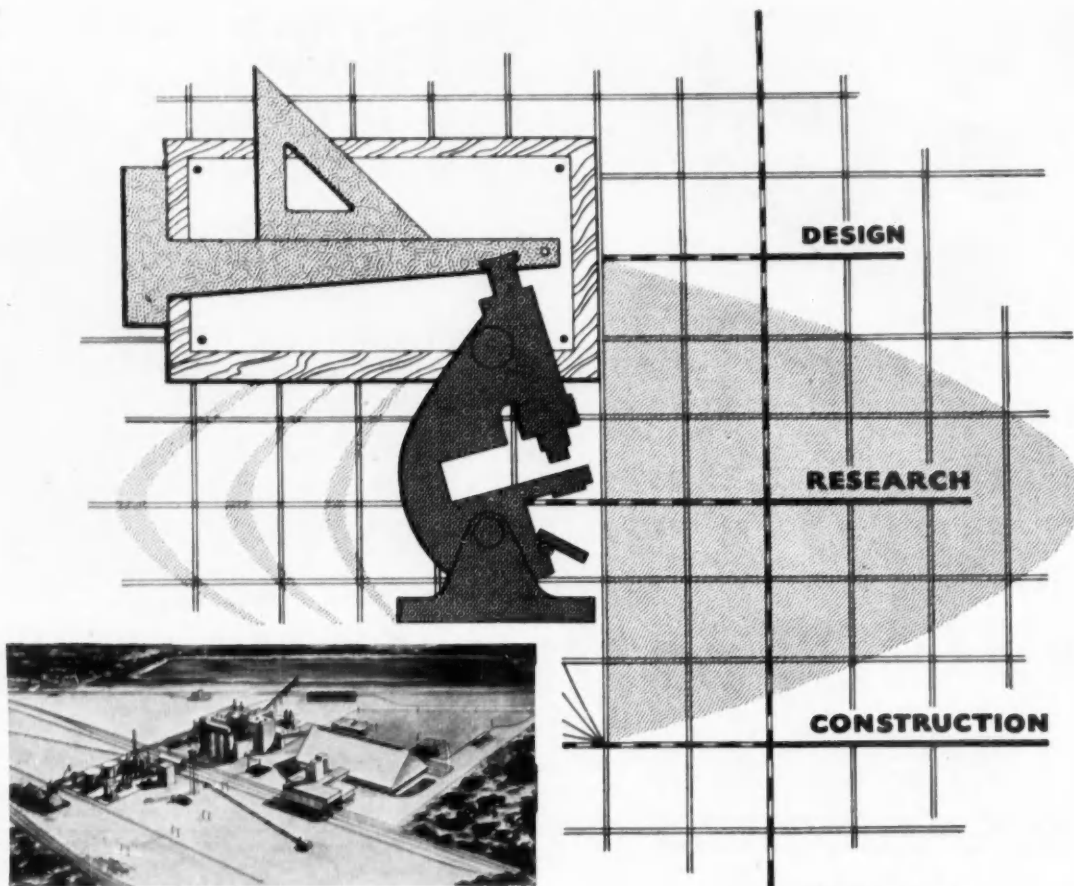
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VOL. LXXVI No. 194

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# THE CHEMICAL AGE

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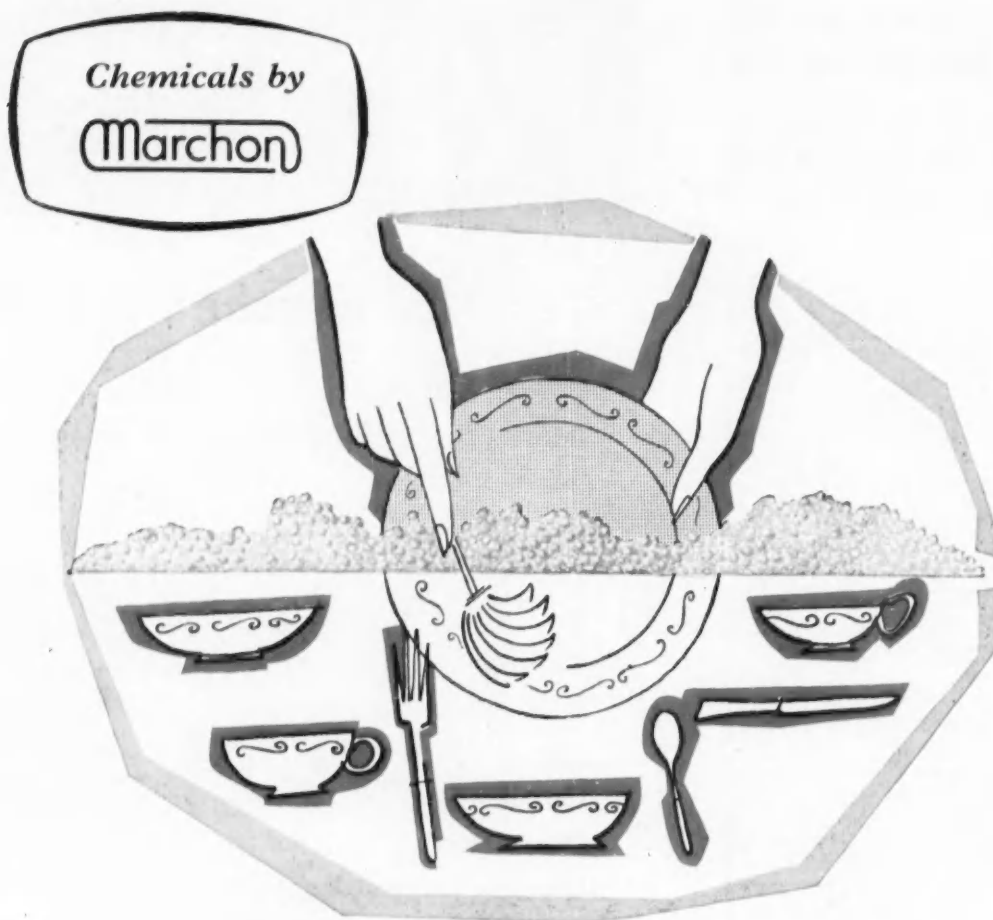
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## VIEWPOINT

# Free Trade Area

A GENERATION or so ago nothing stirred political emotions more certainly than 'free trade,' yet the Chancellor's autumnal proposal that Britain should consider supporting the European Customs Union project caused less public rustling than the falling leaves. To the public—even before the Middle East crisis preoccupied thought and headlines—the issue was the concern of politicians, economists and industrialists.

No one need assume that this atmosphere of public disinterest would not suddenly alter if the course taken began to produce unfavourable results.

The form of association which the Government has in mind would be a partial free trade area, consisting of the customs union of the Brussels group of six powers, the UK and such other OEEC countries as wished to join. The difference between a free trade area and a customs union is that in the latter case there is a common tariff against all other countries, while in the former each country is free to preserve its own tariff against other countries outside. Within such an area, tariffs (except for revenue purposes) would be gradually reduced and ultimately abolished. The period suggested in Government circles is 10 to 15 years.

Considering the UK attitude on the proposed European Customs Union, the Chancellor has pointed out that if Western Europe, including the UK, could develop into a free trading area, this would prove 'a great source of strength'—Britain would have the full advantages of large-scale production. Moreover it would be advantageous for the Commonwealth as a market and as a source of capital.

Such efforts as have been made to sound opinion in industry have not been very revealing, but during a period when many industrial associations have been considering the views they should express to the Board of Trade, this cautious attitude is understandable. The main impression gathered, however, is that the pros and cons of the proposal are matters of detail rather than of principle, that no one can reasonably say whether it will be a good or bad thing to join in a Customs Union until the terms of membership have been clearly stated. What has so far been said by the Government has been too tentatively defined for reaction from industry to be itself any less tentative.

Tariffs are forms of discrimination, but they are not the only kinds that are used today. A Customs Union of Western European countries would not bring completely free trade if import restrictions by quota systems persisted. Thus, Britain could open to another country one of her commodity markets now mainly supplied by home industry, yet find the *quid pro quo* expectation

of selling other commodities in their markets barred by quota limitations. Also, there is the problem of currency, both in its exchange values and terms of credit. A subsidised system of long-term credit on export sales—already not unknown in international competition—would be even more influential under free trade conditions. Nor is credit all that can be subsidised. The goods sold by a country can be subsidised, and hitherto it has been possible to protect a home industry against this disguised form of dumping only by placing tariffs on imports. It is right, nationally right and not merely through self-interest, for industry to insist that these unknown risks in a Customs Union shall be clarified before any decisions are made.

An example from the chemical industry of this type of risk is not hard to find. Some 25 or 30 years ago superphosphate was traded in Europe at prices often well below its cost of production, and this led to the closing down of numerous manufacturing units and to the technical atrophy of others. No agreement that is related to tariff rates alone will eliminate these other methods of non-free trading—it could, on the contrary, encourage them in any time of trade recession.

Ideally, a Customs Union between countries requires equal impacts of taxation and labour costs upon the costs of manufacture. No one supposes that these are conditions that can be created. In the price make up of most chemicals, the labour cost is low in comparison with many other goods manufactured here. On the other hand, the effects of high taxation on profits, particularly in discouraging investment and plant expansion, fall severely upon chemical industry.

A qualified approval has been given by the TUC on the desirability of Britain joining a partial free trade area in Europe, providing living standards are safeguarded. The favourable view of the TUC to closer economic integration would appear to be due to the feeling that the country cannot afford to be outside.

Yet there must be set against all these doubts another and quite different argument. Will it not endanger British future trading more if the country stands aloof from the Customs Union project? Is there as much choice as is sometimes supposed? If Britain does not join, a mass market in Western Europe will gradually reduce tariffs for German goods while retaining them upon British goods. The country must export to live. A principal reason for this is that a substantial proportion of the national diet has to be imported, and it is already agreed that food supplies will be outside any Customs Union agreement. Judged against this background, the case for joining the Customs Union is powerful, if not undeniable.

## BRITISH CHEMICAL PLANT ORDERS

### Overseas Contracts 'Increasing'—BCPMA Chairman

LINKS BETWEEN the chemical and petroleum industries, the latter soon to be expanded by a one-third increase in the refining capacity in this country, have led to petrochemical plant developments, declared Mr. G. N. Hodson, chairman of the British Chemical Plant Manufacturers' Association Council, on 31 October. He was speaking to over 600 members and guests at the Association's annual dinner in London.

Referring to the 'complete chemical contractor' and the growing wealth of experience and know-how, Mr. Hodson said large contracts were now being awarded with increasing frequency by overseas countries to British chemical engineering firms.

Turning to domestic matters, the chairman referred to the BCPMA information service and to visits paid by members of the research committee to various universities in connection with chemical engineering students and studies.

In a reference to the atomic energy programme, Mr. Hodson pointed out that many of the Association's 220 members had done work for the UKAEA and had thus added to their skill and experience in making and fabricating large-scale chemical plant. The AEA demands had been exacting—a challenge which the industry was equipped to meet. 'This is a measure of the experience and skill available in our industry to meet the searching demands of the chemical industry at home and abroad,' added Mr. Hodson.

#### 'Valuable Contribution'

Sir John Cockcroft, director of the UKAE research establishment, who was the principal guest, said members of the Association had made a valuable contribution to the development of atomic energy during the last decade. At the Windscale chemical separation plant, so good was the quality of the basic research, so good the design, and so excellent the quality of the welding, that few troubles had been experienced. The 'impossible' maintenance of active plant had been shown to be possible. 'For this we have to thank the chemists, designers, builders and operators,' remarked Sir John.

The industry had made important contributions to plant for the extraction of uranium from ores, he continued. The industry was far from its peak. In the future, the amount of uranium ore to be processed in the US will rise from three to six million tons a year; annual production of

uranium oxide in the free world will reach 30,000 tons a year. Capital expenditure on plants will be made. Declared Sir John, 'Here is opportunity for the chemical plant manufacturing industry.'

In the field of basic atomic energy materials the demand for super-pure reactor grade graphite grows rapidly with time. Exotic materials such as beryllium, niobium, zirconium are demanded in tens of tons. A decade ago they existed in tens of grams only. Temperatures of 100 million degrees may be necessary for operating plants of the future.

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*... 'Those mighty pressure vessels surrounding the reactors at Calder Hall—an almost incredible feat of welding and stress relieving ... were thought to be the largest which under all the circumstances could be built. Now the building of much bigger and thicker vessels is envisaged. ...' Mr. G. N. Hodson at the BCPMA dinner.*

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Only the highest standards sufficed and many of the lessons learnt in building plant for atomic energy, and the processes and technology used, had application in fields outside atomic energy.

On the vital subject of training, Sir John had this to say: 'Your members take a vigorous interest in courses and support the drive for more technicians and technologists. Self-help is certainly the surest way. But more can be done by exploiting reservoirs of talent in secondary modern schools which now contain 80 per cent of the children. I am a great believer in the potential capacity of the young. Too often, however, this is left dormant.'

### BP Plan Objections

OBJECTIONS may be raised by the Milford Docks Co. to the British Petroleum Co.'s £5 million scheme for a tanker terminal at Milford Haven.

The Pembrokeshire county planning committee has been informed of this objection, which would be to the Parliamentary Bill which is being promoted to authorise the BP scheme.

A BP spokesman said that 'as the company has not yet itself decided the exact position of its proposed jetty at Milford Haven, it is clearly impossible to say at this time whether it would interfere with other users of the Haven.'

## Extruded Plastics

### Application of Rigid PVC and Nylon Pipes

SUMMING-UP the Symposium on Extruded Rubbers and Plastics, held at the National College of Rubber Technology, London N7, on 30 and 31 October, Dr. H. Barron, the symposium's vice-chairman, said that there had been a superb selection of papers on plastics. He apologised, however, for the limited time given to rubber. Tailor-made extrusion products had been discussed and he thought more would be heard of irradiated polymers.

A new terminology—'reasonable infinity'—had been mentioned. Dr. Barron was sure that this phrase would become a common term as an answer to the question 'How long will this plastic last?' The word superpolythene, now applied to Marlex 50, discussed by J. J. P. Staudinger (British Resin Products), might also be heard more often in the future.

It was evident that the paper by D. J. van Wijk, of the Plastics Research Institute, TNO, Delft, Holland, on the application and testing of rigid p.v.c. and nylon pipes for conveyance of fluids had aroused considerable interest. Such had been the demand for copies of the standard for specifications and test methods for pipes with external diameters up to 40 mm. made of rigid p.v.c. and intended for use as water pipes, which Dr. van Wijk had brought along, that further copies would be run off and forwarded on request as soon as possible.

## Atomic Energy Films

DETAILS of 145 films on atomic energy and related subjects are contained in the October 1956 issue of *Scientific Film Review*. This is the first comprehensive list of its kind. The information is arranged alphabetically by film title and there is a subject index covering the following categories:

Application of radioactive isotopes in agriculture, biology, chemistry, general surveys, handling, industry, metallurgy, meteorology; atomic bomb and civil defence; equipment and apparatus; general surveys; moral, political and religious problems; natural resources; nuclear reactors; occupational safety, progress reports; research centres and atomic energy plants; theoretical aspects.

Single copies of this issue are available direct from the Scientific Film Association, 164 Shaftesbury Avenue, London WC2, price 3s 6d.

# NOTE & COMMENT

## SUEZ AND INDUSTRY

WHEN THIS NOTE was written the Suez Canal was closed. When the Canal is reopened, considerable repairs and clearance will be required. Yet, in the present situation, oil is a vital commodity. Three-quarters of Europe's total requirements are at present met by Middle East supplies. At the current rate of consumption this is equivalent to 100 million tons a year of crude and refined products. Of this total, 65 million tons a year have been passing through the Canal. Indeed, so far this year the figure is estimated at 75 million tons. The amount of oil reaching the UK through Suez is 20,543,000 tons (56 per cent of total imports), some 12,148,000 tons (47 per cent) goes to France, 7,248,000 tons (63 per cent) to Holland and 8,630 tons (15 per cent) to the US.

Present stocks of oil in UK are at their highest level, having been built up since July in anticipation of the possibility of difficulties associated with the Canal. But these stocks only represent six to eight weeks' supply (5 million tons). The greater part of the stocks probably consist of crude oil in the possession of the oil companies. Further supplies should be reaching these shores in 10 to 15 days' time when tankers already en route should arrive.

Tankers are being diverted to the Cape route, but this will increase considerably the delivery time and the cost. In fact, it is estimated that Europe's total oil supplies can be expected to fall by between one-sixth and one-quarter unless more oil is imported from other sources.

Unless the Canal is reopened to traffic in the near future, it seems possible that rationing of oil and petrol in the UK may have to be imposed.

## POSSIBILITY OF SABOTAGE

SABOTAGE of pipelines and pumping stations in the Middle East has been a possibility from the beginning. On Monday it was reported that the flow of oil from Iraq (33.9 million metric tons in 1955) to the Mediterranean had stopped completely with the blowing-up of the Iraq Petroleum Co.'s three pipelines.

Another pipeline said to have been sabotaged is that of the Qatar Petroleum Co. which runs to the Persian Gulf and carries  $5\frac{1}{2}$  million tons of oil annually.

No move to supply Western Hemisphere oil to Europe has yet been made by the US Government, but there have been reports that overseas oil buyers are trying to obtain crude oil from the US and Venezuela. US sources are believed to be sufficient to meet the emergency demand for a week or two, but if the pressure were still on by the end of November shortages would begin to develop.

Largest user of fuel oil in Britain is industry (3,830,000 metric tons). Transport takes a total of 8,395,000 metric tons of all varieties of oil, domestic and commercial take 1,428,000 tons of all types; industry's total excluding fuel oil is 1,078,000 metric tons.

Apart from oil, other commodities which have been transported through Suez include rubber, copper, tin, lead, zinc, jute, etc. Therefore, the importance of the Suez Canal to Britain's economy cannot be over-emphasised. The situation is too serious to admit of political manoeuvres.

## POLYMERISATION RESEARCH

NEW VIEWS on paths of reaction in low pressure polymerisation of polythene were recently reported at the American Chemical Society Division of Polymer Chemistry's Symposium on new olefin polymers at Atlantic City. (*Chem. & Eng. News*, 8 October 1956, 4881.) Thus Standard Oil of Indiana are employing nickel-charcoal and molybdena-alumina catalysts which give polythene at low pressures. In the oxidised state, these catalysts are said to have very little activity, but heating in the presence of hydrogen activates both by partial reduction.

Nickel-charcoal polymers are stated to be softer, more flexible and more soluble than those produced using a molybdena-alumina catalyst. Other interesting properties are that molybdena-alumina polymers have greater strength, greater density and crystallinity and double bonds are about 70 per cent internal and 30 per cent external.

Activation of the catalyst in a manner similar to hydrogen, but at lower temperatures, is possible using promoters. Thus, sodium, calcium hydride, and lithium aluminium hydride have been found to activate molybdena-aluminium catalysts. Such promoters reduce and activate spent catalysts, scavenge catalyst poisons present and enter directly into the catalytic process. Ethylene polymerisation over a molybdena-alumina catalyst with calcium hydride has been found to be 30 times that when no promoter was used.

Other research investigations have shown that organometallic compounds such as monovalent butyllithium and titanium catalysts are involved in important mechanisms of initiation, growth and termination of ethylene polymerisation.

Growth reaction mechanism for polymerisation in which the metallic ion is bound to the surface has been proposed. An ion-radical forms by reaction with adsorbed olefin.

# People in the NEWS

● Managing director of Griffin & George Ltd, laboratory furnishers, and chairman of the British Laboratory Ware Association, MR. NORMAN MCKINNON WOOD, sailed from Liverpool recently on a visit to the US. He will call on the company's agents and see customers to ascertain the US users' particular needs in laboratory equipment.

● Remington Rand Ltd. has formed an electronics division because of the immense potential in the field of electronic office equipment. Heading the division is MR. C. W. ELLIOTT as national sales manager.

● At the autumn convocation of the Textile Institute in Manchester on 26 October, the Warner Memorial Medal (awarded in recognition of outstanding work in textile science and technology, the results of which have been published) was presented to DR. J. M. PRESTON (Aintree). DR. F. C. TOY (Wilmslow) also received the Institute Medal for distinguished services to the textile industry in general and to the Institute in particular.

● Formerly London area sales manager of The National Gas & Oil Engine Co. Ltd., MR. W. L. BECKETT, has been appointed London manager of the company and a director of its subsidiary, National Oil Engines (Export) Ltd. In both positions he succeeds MR. F. D. LANGLEY, who has retired after 34 years' service with the parent company.

● Joint winners of the 1956 Nobel prize for chemistry are PROFESSOR SIR CYRIL HINSHELWOOD, president of the Royal Society and Dr. Lee's Professor of Chemistry at Oxford, and PROFESSOR NIKOLAI SEMENOV of Moscow. They win the prize for their researches into the mechanism of chemical reactions and will share prize money of

more than £14,000. Sir Cyril, who is a past president of the Chemical Society, has said that he and Professor Semenov met in Moscow in 1945. They had exchanged papers and views and worked along related lines; although not on quite the same lines. He hopes to go to Stockholm to receive the prize. Professor Semenov is the first Soviet citizen to receive a Nobel prize.

● Native of Porthcawl, South Wales, MR. GEOFFREY SIMS-DAVIES (43) has been appointed equipment manager of British Oxygen Gases Ltd. He joined British Oxygen in 1938 as an assistant engineer, and became chief engineer for British Industrial Gases in 1940. Latterly he has been BOC district engineer for Lancashire. MR. ROBERT FANNON, formerly superintendent of the process development section, British Oxygen, Cricklewood, becomes assistant to Mr. Sims-Davies.

● DR. W. M. CUMMING, O.B.E., D.Sc., F.R.I.C., F.Inst.Pet., M.I.Chem.E., F.R.S.E., formerly of The British Dyestuffs Corporation, Huddersfield, and later professor of technical chemistry and director of the School of Chemistry in what is now The Royal College of Science and Technology, Glasgow, has retired from his post as technical director to The British Dyewood Co. Ltd. and has set up as a technical consultant. All communications should be addressed to 6 Maryville Avenue, Giffnock, Glasgow.

● PROFESSOR R. D. HAWORTH, F.R.S., professor of chemistry at Sheffield University, has been awarded the Davy Medal by the president and council of the Royal Society in recognition of his distinguished contributions to the chemistry of natural products, particularly those containing heterocyclic systems.

● Chairman of the newly formed Dyers of Man-made Fibre Fabrics Federation Ltd. is MR. JAMES EWING of the BDA and the secretary is MR. JOHN AINSWORTH. Members of the council include: MR. P. F. CROSLAND, MR. W. CROSSLEY, MR. D. HAROUN, MR. F. CUSACK, MR. J. RUDDY, MR. J. A. STOTT, MR. S. FOSTER, MR. E. P. HANRAHAN, MR. G. H. HEAP and MR. J. BLAKELEY.

● MR. JAMES B. LONGMUIR, who has represented Megator Pumps & Compressors Ltd. in Scotland for the past six years, has been appointed to the newly created post of Scottish regional manager.

## Atomic Lubrication

### Molybdenum Disulphide Used at Calder Hall

LUBRICATION of the 60 control mechanisms at Calder Hall atomic power station is carried out by the use of molybdenum disulphide manufactured by Rocol Ltd. of Rocol House, Swillington, Leeds, Yorkshire. Ordinary lubricants are rendered useless by nuclear radiation and by the atmosphere of dry carbon dioxide. Water vapour is required for graphite lubrication.

Tests were carried out on many types of solid lubricants and those based on molybdenum disulphide manufactured by Rocol were found to be the most satisfactory. Rocol developed a varnish known as Molytox which produces a molybdenum dioxide film.

Molytox is also claimed to provide protection against corrosion by carbon dioxide, heat and humidity.

## Ethylene Glycol Plant

IMPERIAL Chemical Industries Ltd. is building a second ethylene glycol plant, together with increased ethylene oxide capacity, at its Wilton works in North Yorkshire. It will come into production early in 1959 at the same time as the third olefine plant, from which it will draw its ethylene. The combined capacity of the two ethylene glycol plants will be 16,000 tons a year. The principal uses of ethylene glycol are for Terylene fibre, motor car anti-freeze, and explosives.

## New Resin Development

GOOD compatibility characteristics are claimed for Scopol 41HM/70, a new resin made by Styrene Co-polymers Ltd. Scopol 41HM/70 is a long oil alkyd copolymerised with vinyl toluene. It is said to combine resistance to conditions promoting bloom formation with good drying properties under adverse weather conditions. It is recommended for use in decorative finishes.

## Protective Duties

AN APPLICATION for increased protective duties on antimony metal, in any form; antimony oxides and mixtures containing not less than 85 per cent by weight of antimony oxides expressed as antimony trioxide; and, alloys of metal, in any form, containing not less than 85 per cent by weight of antimony, is being considered by the Board of Trade.

# Carbonisation & Chemical Plant

NCB £10m. PROJECT AT WINGERWORTH

THE National Coal Board's £10 million Avenue Carbonisation and Chemical Plant at Wingerworth, near Chesterfield, said to be the most modern and completely integrated of its kind in Britain, was opened by the Minister of Fuel and Power, Mr. Aubrey Jones, on Tuesday 30 October. The site is three quarters of a mile long and covers 188 acres. There are two and three quarter miles of roads and 13 miles of rail track. Some 760 men were employed on construction, which was completed in four years. The total staff and men employed to run the plant is 475.

The plant embodies a basic coking unit, consisting of two batteries, each of 53 Woodall-Duckham Becker Combination Underjet type ovens, together with primary and secondary by-product plants. The batteries are built in line with the coal storage bunker between them and with two stacks centrally located on the west

side of the bunker. One of the batteries has been in operation for some months; the second battery went into operation after the official opening. Each oven is 41 ft. 1½ in. long between the doors, 13 ft. high with an average width of 16 in. and a capacity of 657 cu. ft. They are arranged for heating either by coke oven gas when the underjet system is employed or by producer gas generated in the producer gas plant.

There are four charging holes per oven, each of 18 in. diameter, and two gas take-offs per oven. The oven chimneys are 250 ft. high with an internal diameter of 9 ft. The service bunker has a coal capacity of 4,000 tons. Special self-sealing doors of a new design developed by the Koppers Co. of Pittsburgh, US, are fitted to the ovens. They are in operation for the first time in Britain.

When the plant is in full production it will carbonise 2,175 tons of coal containing 8 per cent moisture a day, to produce 1,400 tons of coke and 27 million cu. ft. of gas daily. Layout has been designed to allow future capacity to be doubled by the provision of further buildings and

equipment without disturbing the present layout.

Much of the gas produced is used to fire the oven heating flues, but some 14 million cu. ft. a day will be fed into the public gas supply.

Chemical plant, which includes both primary and secondary by-product units, handles the by-products not only of Avenue but also of other coke ovens in the East Midlands Division. It can deal with the by-products from 4,500 tons of coal a day, and the output includes sulphuric acid, sulphate of ammonia, benzole, pure toluene, pure xylene, pitch, pitch creosote fuel, high grade naphthalene, carbolic and cresylic acids, pyridine and anthracene.

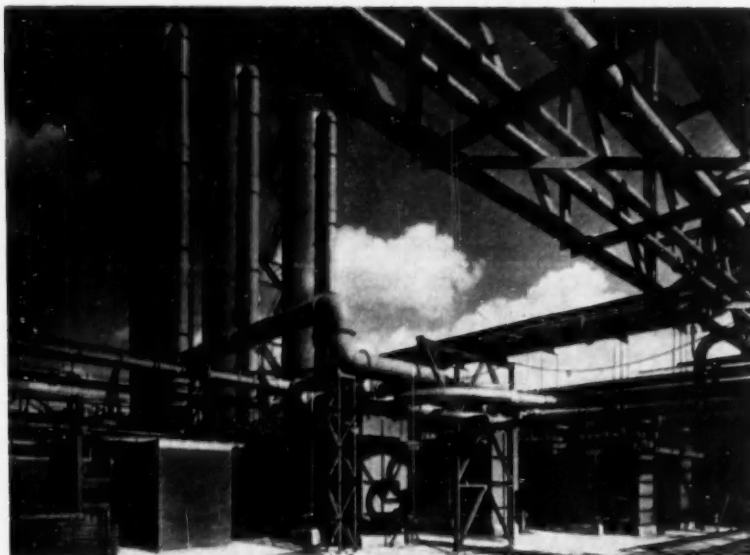
Equipment included in the primary by-product section is designed for the cooling and washing of the gas for the recovery of tar and ammonia liquor, the removal of naphthalene and the dilution and boosting of the purified gas available for distribution.

Gas from the downcomers passes in two separate streams to the primary coolers, exhausters and tar extractors.

There are five primary coolers of the Whessoe multipass vertical water

*View of the Avenue carbonisation and chemical plant. Photograph by courtesy of Woodall-Duckham Construction Co. Ltd.*





*The benzole scrubbers, secondary naphthalene washers and ammonia washers. Photograph by courtesy of Woodall-Duckham Construction Co. Ltd.*

tube type arranged to work in parallel with two coolers for each gas stream and the fifth as a common standby. The coolers each have six passes and a water cooling surface of 16,500 sq. ft. From the primary coolers the gas is passed by the exhausters to the electro-detarrers.

The three exhausters are BTH turbo-exhausters of axial inlet radial flow type. There is one exhauster for each gas stream with the third as a common standby and each is capable of passing all the gas produced by one battery and of delivering it against a back pressure of 2½ p.s.i. although they normally operate between 1 and 1½ p.s.i.

Each exhauster is direct-coupled to a steam turbine operating with steam at 120 p.s.i. and exhausting against a back pressure of 15 p.s.i. An Askania regulator controls the hydraulically operated steam throttle valves and maintains a constant suction on the gas inlet.

#### Electro-detarrers

There are four Whessoe W-D electro-detarrers of 8 ft. dia. These are of the vertical tube suspended wire electrode type. Normally two detarrers are in operation on each gas stream but any three units are capable of handling between them the total gas of both streams. Alternatively, one detarrer can be taken off either stream with only a slight reduction of tar extraction efficiency on that stream.

From the electro-detarrers the gas passes to a range of primary naphthalene washers and, after re-cooling

in the secondary condensers, to the ammonia washers. The four primary naphthalene washers are of W. C. Holmes design and there are two working in series in each gas stream. Each can be by-passed. Each washer has four washing chambers with timber and reed filling. The oil used as the washing medium is anthracene oil from the tar plant and it is treated in a W. C. Holmes oil regeneration plant.

The gas is then cooled in two Whessoe multipass vertical water tube type condensers, one in each gas stream. Each condenser has six passes and a water cooling surface of 13,000 sq. ft.

#### Ammonia Washers

Six W. C. Holmes ammonia washers are arranged so that three operate in series in each gas stream. Any unit can be by-passed as the remaining units are capable of dealing with the total gas load. Each washer has four washing chambers and is identical in design and size with the primary naphthalene washers.

Washing medium is weak 'fixed' liquor bled from the flushing liquor main and/or condensate from the crude benzole separators and, to remove the final traces of ammonia, a limited quantity of soft water. Special coolers reduce the temperature of these liquids before use. The strong ammonia liquor leaving the washers gravitates to the strong liquor sump.

Gas leaving the ammonia washers passes through a vertical down flow type water separator to remove

## NCB Plant

entrained moisture and on through three benzole scrubbers, which are 106 ft. high and 13 ft. 6 in. dia., to the secondary naphthalene washers through which it passes in two streams.

The four W. C. Holmes secondary naphthalene washers are identical with the primary naphthalene washers and two are arranged to operate in series in each gas stream.

The gas purification plant, designed and constructed by Newton Chambers & Co. Ltd., is of the tower type and can purify 26 million cu. ft. of gas per day. The whole plant comprises two sets of towers operating in parallel, each set being capable of purifying half the total throughput. The purification process is based on the normal reaction between hydrogen sulphide and the contact mixture of hydrated oxide of iron, and hydrogen sulphide is removed from the gas down to the statutory limits prescribed by the Gas Regulation Acts.

Gas purification plant comprises four Waller gas compressors, each of which is capable of compressing 6,000,000 cu. ft. of gas per day measured at 60°F and 30 in. Hg and of delivering it at a pressure not exceeding 25 p.s.i. Two are steam driven and two electrically driven and each is capable of boosting six million cu. ft. per day at a maximum pressure of 25 p.s.i.

There are two Holmes Connersville meters of the positive displacement type, each with a normal capacity of 10,800,000 cu. ft. per day which, for emergency use, can be increased to 16,200,000 cu. ft. per day. The meters are arranged to operate together in parallel.

The purified gas holder is a Newton Chambers two lift spirally guided holder with a storage capacity of 500,000 cu. ft. It is of welded construction and the tank is 108 ft. 6 in. in diameter. When fully inflated the holder throws a pressure of 9 in. w.g.

#### Kachkaroff Acid Plant

Kachkaroff sulphuric acid plant was installed by Simon-Carves Ltd., the design being provided under licence by The Chemical Plant & Sulphur Extraction Co., London. The process works on the principle of the intensive tower system. The only other similar plant in this country is at the South Eastern Gas Board works at Phoenix Wharf. At Wingerworth, Flixborough rotary burners are installed with the specific object of so treating the spent oxide that the result-

## Wingerworth

ing cinder, as recovered, when mixed with peat and sawdust, is suitable for re-charging to the oxide bones for  $H_2S$  removal, without further addition of revivifying material.

There are two rotary burners included in the plant for burning spent oxide with a normal sulphur content varying between 46 per cent and 48 per cent. Each burner comprises an inner and outer shell, the outer being constructed of mild steel and lined with firebrick and provided with oxide lifting apparatus. The inner shell or tube is constructed in heat resisting steel to withstand the temperature obtaining within the burner. After ignition of the spent oxide, the oxide and cinder passes to the discharge point and the gases produced return to the feed end where they are conveyed to the gas ducts and dust removal system before being boosted for entry into the Kachkaroff acid plant.

Furnace gases containing five to six per cent  $SO_2$  enter the acid section of the plant at the concentration tower and pass in parallel through the denitration tower, which is divided vertically into two sections, both towers operating under slight pressure. After cooling in the atmospheric cooler, the gases are drawn through the four reaction towers by means of a fan and finally escape to the atmosphere via the filter tower. All gas flows, other than in the reaction towers, are in counter current to acid. Gas therefore passes through the concentration tower, denitration tower, reaction towers, and filter tower in that order and acid circulations are maintained over each tower by means of circulating pump systems associated with acid cooling plant.

Sequence of the process is (a) receipt of the spent oxide from the tower puri-

fiers where sulphur as sulphuretted hydrogen has been recovered from the coke oven gas, (b) combustion of the sulphur to sulphur dioxide, (c) conversion of the sulphur dioxide to sulphur trioxide and the formation of sulphuric acid which is used to make ammonium sulphate from the ammonia also recovered from the coke oven gas. The cinder produced is mechanically blended with peat and sawdust and the mixture is returned to the oxide towers, thereby completing the cycle. The plant is capable of producing 65 tons per day of 77 per cent acid.

The Royston ammonium sulphate plant is capable of producing 35 tons per day. It consists of two Woodall-Duckham stills, one working and one as a stand-by, together with Limbux liming equipment; two saturators and auxiliary equipment, one working and one as stand-by; flash drying equipment for drying and neutralising; and automatic bagging and storage for 1,500 tons bagged sulphate.

### Effluent Treatment

Effluent treatment plant was designed by The Permutit Co. Ltd. on the basis of the Corby process, and developed by co-operative research with the Woodall-Duckham Construction Co. Ltd. and Stewarts & Lloyds Ltd.

Its purpose is to purify the noxious effluent from the sulphate plant so that the liquor can be discharged safely into the river. The plant employs a new process of dealing with the noxious liquor and is the result of many years of research and development.

*The pusher side of the north battery at the new Avenue carbonisation and chemical plant (left) with the coke side of the batteries (north battery in operation, south battery with temporary heating-up pipe in position) to the right. Photographs by courtesy of Woodall-Duckham Construction Co. Ltd.*

The plant was designed to purify up to 185,000 gallons of liquor daily. It removes thiocyanates and thiosulphates and concentrates them into a volume of 1.1 per cent of the inlet liquor for easy disposal. In addition, the monohydric phenols are recovered and passed to another section of the coke works for final purification.

Care has been taken to ensure that the maximum volume of ammonia, hydrochloric acid and benzole are recovered and distilled, where necessary, for further use, thus reducing the make up requirements.

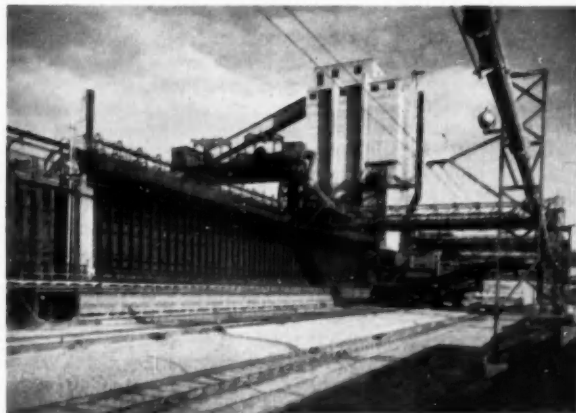
### Purification Stages

Purification is carried out in the following five stages; Settling and cooling; filtering and acidification; removal of thiosulphates and thiocyanates by ion exchange; concentration of the reject liquor containing thiosulphates and thiocyanates; removal of phenols and higher tar acids by activated carbon absorption.

The hot untreated effluent passes first to one of two 62,000 gallon concrete sedimentation tanks. The settled effluent is then pumped from the sedimentation tanks through a rack cooler to a cooled effluent sump.

Liquor is pumped from the cooled effluent sump by the main feed pump and passes through a battery of four sand filters. It is then dosed with hydrochloric acid to lower the pH to a suitable level for ion exchange treatment.

Thiosulphates and thiocyanates in the liquor are removed by a battery of three ion exchange units containing De-Acidite ion exchange material. When the capacity of this material is exhausted the accumulated inorganic salts are removed by flushing with ammonia solution. The free ammonia in this reject liquor is recovered by distillation in a separate ammonia distillation plant. The reject liquor from this ammonia distillation plant is concentrated to a small volume in a submerged flame concentrator which



## NCB Wingerworth

reduces the bulk to about one per cent of the effluent treated.

The De-Acidite treated liquor is collected in a storage tank and pumped to a battery of carbon filters which remove the monohydric phenols and higher tar acids.

When the carbon has become saturated the phenols and tar acids are removed by treatment with benzole. The majority of this benzole is recovered in a separate benzole distillation plant. The reject liquor from this plant consisting of phenols and tar acids and a small proportion of benzole is worked up in a separate part of the Avenue plant. The effluent from the carbon units is then treated with lime and discharged as a colourless innocuous solution into the works drain system.

### Benzole Rectification

A Woodall-Duckham benzole rectification plant of 20,000 gallons per day capacity has been installed to produce pure products for the chemical industry. In this section the  $CS_2$  free one-run benzole from the recovery plant and imported  $CS_2$  free benzole are washed and treated in continuous and batch rectification stills for the production of motor spirit, toluole and all grades of benzole fractions including pure products. The equipment includes benzole washers, continuous benzole and toluole columns and batch stills for pure benzole, toluole and xylene production.

For the production of motor spirit or benzole fraction the product from the once-run column of the recovery plant or the imported product is washed with acid and soda in the benzole washers.

A Chemical Engineering Wiltons Ltd. tar plant, of 200 tons per day capacity, is designed for an eventual daily capacity of 400 tons of crude tar. The plant comprises the following unit processes: Wilton tar distillation unit; tar acids extraction unit; tar bases extraction unit; naphthalene unit; anthracene extraction unit; blending unit; pitch production; and storage.

In the Wilton tar distillation unit the crude tar is fractionated to pitch and the following oils: Benzole, solvent naphtha, carbolic oil, naphthalene oil, creosote, anthracene oil. The unit is operated continuously and incorporates a radiant type pipe still. It is flexible in operation both in regard to throughput and the hardness of pitch.

The tar acids extraction unit extracts tar acids continuously from the carbolic and naphthalene oils produced

in the distillation unit. The extraction is achieved by reaction with caustic soda prepared in the causticising plant. The cresylate solution produced is de-oiled and contacted with  $CO_2$  to release the tar acids. The sodium carbonate solution is returned to the causticising plant for regeneration. The steam boiler situated on the site is primarily intended for production of  $CO_2$  the steam raised being consumed within the works.

To recover tar bases (principally pyridine) a number of the oils from the distillation unit are washed with sulphuric acid in the tar bases extraction unit. The sulphates produced are then reacted with ammonia gas to release the tar bases. These bases are subsequently dried by washing with caustic soda.

Naphthalene oil from the distillation unit is treated to produce saleable naphthalene either in the form of liquid or flake. This naphthalene is mainly used in the production of phthalic anhydride. The naphthalene oil is fed to static crystallisers, allowed to cool and crystallise and the oil is drained off. The crystals are then washed with methanol solution to remove the maximum amount of the remaining oils. The methanol solution is redistilled for further use.

Anthracene oil from the distillation unit is first allowed to crystallise and the oil drained off. The crystal magma is then centrifuged to produce an anthracene paste which is fed to a hopper for subsequent bagging. The blending unit, which consists primarily of mixing vessels, is used for the production of pitch creosote blends, road tars, or fuel oils, to various specifications.

Part of the pitch is used for production of pitch creosote blends or road tars. Subject, however, to market requirements a proportion of the pitch is stored in solid form in open bays. Facilities are available for increasing the hardness of the pitch produced on the distillation unit. This harder pitch has a number of applications among which are electrodes, coal blending and pulverised fuel.

The whole plant at Wingerworth is serviced with power and steam. The steam raising plant consists of three breeze-fired water tube boilers of the Babcock CTM type, each generating 60,000 lb. of steam per hour at 475 p.s.i. and 640°F superheat.

### Ceylon's Salt Harvest

THIS YEAR, 80,000 tons of salt have been collected, the greatest-ever salt harvest, while a further 20,000 tons are expected to be collected before the end of the year. Ceylon's annual consumption is approximately 55,000 tons.

## Information Guide

### Investment and Operating Costs of US Chemical Industry

A COMPREHENSIVE guide to recently published information on investment and operating costs in the petroleum and chemical industries of the United States was released recently by the Bureau of Mines, Department of the Interior.

Intended to aid plant managers and others who purchase equipment and plan operations, the volume contains abstracts of more than 600 articles and technical reports published in the US between July 1952 and June 1954. It supplements two earlier bibliographies on the same subject.

### Wide Range of Topics

Topics covered in the new publication range from cost comparison studies for various types of chemical- and petroleum-processing equipment to the chemical engineering aspects of nuclear power. Many of the references are to articles dealing with some phase of the petrochemical industry, reflecting the rapid expansion in this field during recent years.

A copy of information circular 7751, *Bibliography of Investment and Operating Costs for Chemical and Petroleum Plants, Supplement 2, July 1952-June 1954* can be obtained from the Bureau of Mines, Publications-Distribution Section, 4800 Forbes Street, Pittsburgh 13, Pa.

## Polyol Plant Construction

TO MEET the increasing demand for trimethylolpropane in the rapidly growing polyurethane plastics and coatings field, Celanese Corp. of America has started construction of a new polyol production unit at its Chemcel Plant in Bishop, Texas.

Mr. R. W. Kix Miller, vice-president and general manager of Celanese chemical division, in announcing construction of the new facility, reports that it will use special aldol processes developed by Celanese and will greatly expand capacity for polyol and aldol production which began a year ago with the start-up of a semi-works unit.

The new commercial unit is expected to be completed and producing by the last quarter of 1957. In addition to providing trimethylolpropane and other intermediates for polyurethane synthesis, it will produce a range of other products that will serve end uses in alkyd resins, high quality brake fluids and other expanding industrial fields.

## EUROPEAN FREE TRADE AREA

### FBI Member Firms' Views Sent to BoT

VIEWS of FBI member firms and trade associations on the question of whether Britain should or should not enter into negotiations with the six Messina countries with a view to participating in a European free trade area were set out in a report submitted to the President of the Board of Trade by the Federation on 1 November.

The Federation, which prepared the report at the request of the President of the Board of Trade, held two meetings of its grand council. The 10 regional councils also met, and the opinions of 287 trade associations in the FBI's membership, which between them cover some 20,000 individual firms, were invited. The Federation also gave an opportunity to any of its 7,400 individual members to express opinions, unless they were satisfied that their views would be covered through one or more of the trade associations.

The 10 regional councils of the FBI each consist of some 30 leading

industrialists drawn from varied firms and cover geographically the whole of England, Scotland and Wales. Each has discussed this problem at length, special meetings having been called for that purpose where necessary. With one exception (the North Midlands) the view was formed that the UK could not afford not to negotiate with a view to reaching acceptable terms for joining a partial Free Trade Area, subject to various conditions. These views, however, were not representative but personal to the men concerned.

Many of the 287 member trade associations have not felt it appropriate to express views on this subject. In many cases trade associations have not been unanimous. The report points out that 'both on these grounds, and also because of the widely differing economic importance of the various industries, it would be quite wrong to express the weight of opinions by merely counting heads.'

## ITALIAN CHEMICAL TRADE

### Imports Rising More Rapidly Than Exports

ITALIAN imports of chemicals have been increasing more rapidly than exports, according to data released by the National Association of the Chemical Industry in Italy (Istat).

Most anxiety is being felt in the group described as 'various products of the chemical industry,' which consists largely of complex products manufactured in many cases by small or medium size companies which do not have the resources to stand up to keen foreign competition. In the first six months of the current year the value of imports was 14,397 million lire, against 9,480 million lire in the corresponding period of 1955.

#### Grave Considerations

Our Italian correspondent says that grave considerations are suggested by the data given by Istat. In all branches of the chemical industry, particularly in the principal ones, he says, foreign competition is increasing and shows vigour and aggressiveness both in Italy and abroad, while, with the exception of some categories, the national industry is declining.

Among reasons suggested for this decline are the want of an economic policy consistent with the aims of the Vanoni plan which presupposes for the chemical sector an increase of ex-

ports more than proportional to that of imports, the continual rise in the cost of production, obstacles that hinder new investments, and political interference.

An analysis of the data supplied by Istat shows that in 1955 imports of chemical products increased by 21.9 per cent against a 17.7 per cent increase in exports. In the first six months of this year the figures were 25.3 per cent against 8.1 per cent.

### Delegation Returns

THE THREE British plastics manufacturers (Mr. Herbert Bridge, British Moulded Plastics Ltd., Mr. Jack Lesser, Crystalate Ltd., and Mr. R. Sternberg, Sterling Moulded Materials Ltd.) who have been visiting Russia as guests of the USSR Government (see THE CHEMICAL AGE, 3 Nov., p. 211) have now returned.

They are preparing a full report on their visit, the result of which has been to convince them that a great increase of trade from this country to Russia in plastics raw materials, finished articles, tools and plant is possible. A return visit of a Russian plastics delegation is expected here some time this month.

## Protective Suit

### Terylene Coated with Geon PVC

A SPECIAL light-weight protective suit of Terylene coated with Geon p.v.c. weighing only 3 lb. (approx) has recently been developed by the RFD Company Ltd., 35/9 Maddox Street, London W1, for rocket research workers. It is designed to give protection against high test peroxide (90 per cent hydrogen peroxide) used as jet and rocket motor propellant. In addition to withstanding attack by hydrogen peroxide, Geon p.v.c. is not harmed by repeated flexing and permanent protection over long periods of service is provided. Personnel on the Rocket Test Beds of the de Havilland Engine Company and Armstrong Siddeley Motors Ltd. are already using the suit.



Protective suits in use on the rocket test beds of the de Havilland Aircraft Co.

### Expansion Plans

PLANS for the rebuilding and modernising of Joseph Crosfield's soap and chemical factory at Warrington were announced recently. An eight-year programme costing £5 million is envisaged. It will be financed by the parent company, Unilever Ltd. According to Dr. J. E. Taylor, chairman of Crosfield's, it will take two years for the plan to start.

The present factory buildings lie on both sides of the Mersey. The ultimate intention is to concentrate production on the Lancashire side to avoid the movement of men and materials across to the Cheshire side. To carry out this concentration it will be necessary to build upwards.

## Flexikote Developed

### Non-Inflammable Asbestos Emulsion Coating

DEVELOPMENT of a new type of asbestos emulsion coating, of interest to companies with a corrosion problem, is announced by Solvolene Lubricants Ltd., Reginald Square, London SE8. Known as Flexikote, the new material is non-inflammable and it is claimed that it can be applied to surfaces such as boiler chimneys that remain at temperatures above 200°F.

### Long Life Claimed

Tests have shown that Flexikote has a long life and retains its flexibility and plasticity even when the surface is subjected to continuous vibration or flexing. When Flexikote has been applied, either by brush or low pressure spray, on to any type of surface, it will be found that the coating, while dry to handle after 24 hours, remains slightly tacky indefinitely; it never completely dries out or hardens or flakes, claim the makers, and it is unaffected by fresh water, brine, or sun.

Very little preparation of the surface is necessary before applying Flexikote. Wire-brushing to remove loose rust is normally adequate for iron or steel.

As well as its applications as a corrosion preventative the makers claim that Flexikote can be used as a water-proof sealing compound for brick-work and woodwork.

Coverage obtained from this material works out at about 70 sq. ft. from one gallon, and the cost is said to be less than that of paint.

## Tubing and Bungs

BRITISH STANDARD for rubber tubing and bungs for laboratory use (BS 2775:1956) was prepared primarily to reduce the variety of sizes of rubber tubing at present being used. Only metric sizes have been standardised and three thicknesses of tubing are provided for: normal wall tubing, medium wall tubing and thick wall tubing. Two sizes of analytical tubing are provided for. The tube with the smaller bore is to be made of either natural or synthetic rubber; that with the larger bore is to be made of natural rubber. Physical requirements of rubber bungs for laboratory use are specified. It was found impracticable to standardise the sizes of bungs owing to the great variety of sizes in current production.

Copies of this Standard are available from the British Standards Institution, 2 Park Street, London W1.

## NEWS FROM SOUTH AFRICA

### United Chemicals Detergent Factory

ONE OF South Africa's most hush-hush mines is the monazite mine of Steenkampkraal, situated about 54 miles north of Van Rhynsdorp in the north-west Cape. This mine, which has been producing monazite since August 1953, is under the control of the Atomic Energy Board and the product, after preliminary concentration, is sent to America. Water, of which the mine requires 30,000 gallons a day, has to be brought from Klawar, 65 miles away, in four tank lorries. These lorries are also used for transporting the monazite.

United Chemicals & Industrials Ltd. are now operating at a new factory with a floor area of nearly 20,000 sq. ft. at 41 Williams Road, Durban. The new factory has been carefully designed to facilitate the various manufacturing processes involved in the production of the detergents and other chemicals made by the company. Included in the new range of chemical products are liquid and powder detergents for cleaning greasy workshop floors and removing oil from dirty surfaces, and the detergents needed for various types of industrial cleaning and also detergents for home use. Wood preservatives and chemicals for the building industry are also being made.

Hickman & Kleber (Pty.) Ltd., 271 Umbilo Road, Durban, are manufacturing for industries and laboratories in South Africa a wide variety of special chemicals and allied compounds that are not easy to import because they deteriorate rapidly when stored for any time. They also supply at short notice chemicals which manufacturers might not consider it desirable to keep in stock in quantity. The local firm insists that these manufactures are competing in both quality and price with imports and that it can cope with the most urgent orders at very short notice. It is also possible for manufacturers in South Africa to take their special problems to them for solution, says the company.

Midas Chemicals (Pty.) Ltd., 22 Andries Street, Troyeville, Johannesburg, report that it is now manufacturing nearly 50 industrial adhesives, and in addition is producing various other adhesives to the specifications of customers. This has demanded the provision of large research laboratories. Among the adhesives made by this firm is one for the repair of jute bags. It is also making a variety of release agents for metal, rubber and allied industries, some of these release agents being of the high temperature mould type.

## PROVIDING SMOKELESS FUEL

### Coal Largest Source of Pollution

TASKS facing the National Coal Board in providing smokeless fuel were referred to by Dr. W. Idris Jones, the Board's director-general of research, at the recent conference of the National Smoke Abatement Society held in Southport. He said that to meet the recommendations of the Beaver committee the NCB would have to increase production of manufactured smokeless fuels. This would call for a vigorous development programme to translate the results of research work into commercial production.

Dr. P. J. Lawther, director of the Medical Research Council group for research on atmospheric pollution, told the conference that burning coal was the largest source of air pollution. He said there was absolutely no evidence to justify the allegation that diesel engine fumes were responsible for the rise in incidence of lung cancer.

Regulations prescribing authorised fuels to be used in areas of smoke

control are being prepared, Mr. Enoch Powell, Parliamentary Secretary, Ministry of Housing and Local Government, told the conference. He said the Clean Air Council would be appointed shortly. The Minister would be chairman and members would be drawn from industry, local authorities and fuel producers. It would be a consultative body.

### Coke Ovens Lit

A BATTERY of 150 coke ovens, the largest in Britain, has been lit at the South Bank-on-Tees works of Dorman Long & Co. (Steel) Ltd., and when in full operation will carbonise 25,000 tons of coal a week, producing 15,000 tons of coke. The ovens, which have been built by Simon-Carves Ltd., Stockport, are at present being dried out, and it will be some weeks yet before actual production commences.

# Styrene Monomer Plant Extends

## FORTH CHEMICALS AT GRANGEMOUTH

ON THE DAY this issue of THE CHEMICAL AGE went to press (Wednesday, 7 November) the extensions to the plant of Forth Chemicals Ltd., at Grangemouth in Scotland, were inaugurated in the presence of Sir Miles Thomas, chairman of the company, and directors and senior executives of the three companies jointly associated in Forth Chemicals—Monsanto, BP and Distillers.

Speaking at the inaugural ceremony, Mr. J. M. Pattinson, a director of Forth Chemicals Ltd., said 'the large-scale manufacture in this country of petroleum chemicals has come to stay. There can be no reason for the country continuing to import these when the raw material, refined petroleum, is now available in such large quantities from the refineries which have been built here since the war.'

At Grangemouth the new distillation area incorporates some of the biggest columns ever manufactured for the British chemical industry. The largest is 140 ft. high (THE CHEMICAL AGE, 30 June). The new units are more than double the capacity of those originally commissioned in April 1953 and have increased the

total annual capacity of the plant to over 30,000 tons. They embody all that has been learned from the initial operations and incorporate the latest ideas in instrumentation.

Forth Chemicals manufactures styrene monomer which is increasingly in demand by makers of polystyrene plastics, synthetic rubbers and resins and other basic industrial materials (THE CHEMICAL AGE, 15 September). This intermediate had previously been made in bulk as a petroleum derivative in the UK, the chief sources being US and Germany.

The plant, on the south side of the Firth of Forth, some 25 miles from Edinburgh and Glasgow, is close to the works of BP Refinery (Grangemouth) Ltd. (a subsidiary of The British Petroleum Co. Ltd.) and adjacent to the plant built by British Hydrocarbon Chemicals Ltd. for the production of chemicals from petroleum.

Basic raw materials used by Forth Chemicals in making styrene monomer are benzene and ethylene, the latter being piped from the BHC plant.

Materials taking part in the pro-

cesses are all liquids or gases which are handled by pumps or compressors. The scale of operation, the nature of the chemical changes taking place and the strict specifications to be followed for the intermediate and the finished styrene demand the use of continuous automatically controlled processes.

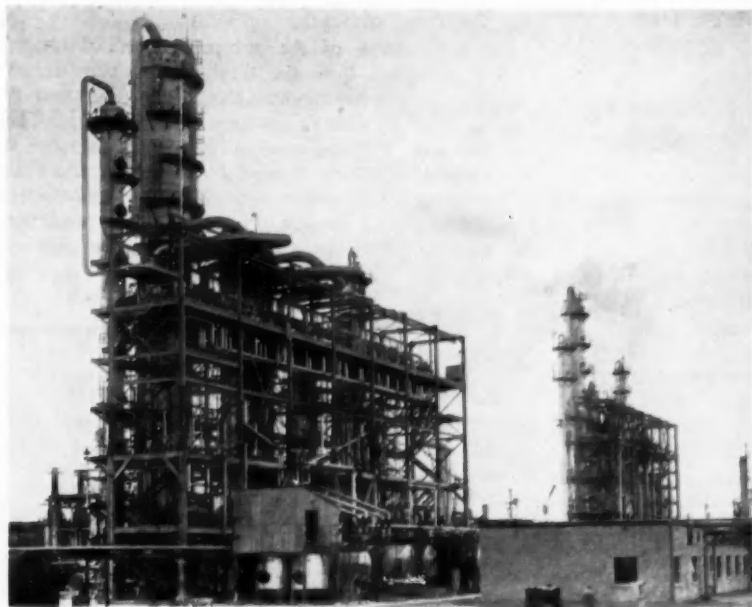
According to information given by Forth Chemicals Ltd., all the plants at Grangemouth are outstanding examples of modern practice; the investment in equipment and instruments for each person is high.

Design work was carried out by the engineering department of Monsanto Chemicals Ltd. which also supervised the construction of the plant (erection contractors Costain-John Brown Ltd. and Matthew Hall & Co. Ltd.). The original plant came into full production in April 1953 but to meet the continually increasing demand for styrene monomer the design of an expansion to double the capacity was started in 1954. Later this was increased.

Styrene monomer first came into prominence as an essential raw material for GR-S synthetic rubber, though the original reason for the formation of Forth Chemicals is the manufacture of polystyrene moulding crystals. As an intermediate it is used in dyestuffs, agricultural chemicals and pharmaceuticals; and also in emulsion for paints, textiles, papercoatings, bonding and laminating agents; low pressure mouldings; shoe solings; conveyor belts, cable sheathings, flooring tiles; air-drying enamels; ion exchange resins used as refining agents and catalysts; protective colloids.

This range of products underlines the importance of styrene monomer as a basic chemical in bulk production; equally it shows how far-reaching is the petrochemical industry and how essential to the development of this industry is an uninterrupted flow of the raw material—oil.

*New distillation area at Grangemouth. At right is the distillation area of the original plant. The columns of the new unit are said to be the largest made in this country*





## Chemist's Bookshelf

**ORGANO-METALLIC COMPOUNDS.** By G. E. COATES. Methuen & Co. Ltd., London; John Wiley & Sons, New York. 1956. Pp. 197. 12s. 6d.

In view of the current theoretical and technological interest in organo-metallic compounds the appearance of this little book will be welcomed. The author has wisely confined his treatment to those compounds which contain only metal-carbon bonds. Thus, organo-metallic structures of the metal salt type, as well as most classes of co-ordination and chelate compounds have been omitted. No attempt has been made to include the extensive chemistry of the semi-metals, silicon, phosphorus, arsenic, selenium and tellurium. The book nevertheless systematically covers a wide field of chemistry from group I to group VI in the Periodic Table. While the emphasis throughout is primarily preparative, the underlying treatment is fundamental and many points of theoretical interest are made. Particularly valuable features are the tables of physical data and the extensive bibliography.

Parts of the book will be familiar ground to those readers already well acquainted with organo-metallic compounds. The sections devoted to the elements of groups III and IV, however, provide a wealth of new material of great contemporary interest and commend themselves particularly to the reviewer. Coverage of the transition elements is necessarily brief in a book of this compactness, but fully adequate treatment is accorded the cyclopentadienyls, the valence structure of which is discussed in some detail. The author is to be congratulated on the timely production of a concise yet comprehensive work which is within the reach of every academic purse.

J. H. TURNBULL

**FLUIDIZATION.** Edited by DONALD F. OTHMER. Reinhold Publishing Corp., New York; Chapman & Hall Ltd., London. 1956. Pp. 231. 56s.

Subject matter of this book is based upon seven papers presented at a symposium on fluidisation organised jointly by the Polytechnic Institute of Brooklyn and the American Institute of Chemical Engineers. At the time of presentation (February 1955) the theoretical aspects of fluid dynamics and heat and mass transfer in fluid-solid systems were omitted from the symposium but in the subsequent preparation of the papers for publication in book form, additional chapters on these subjects have been prepared.

The book contains nine chapters, the first two (Fluid Dynamics by R. F. Benenati and Heat and Mass Transfer by J. C. Chu) being critical reviews of the literature on the subjects, the following seven being the original lectures presented by outstanding authorities from industry. Chapter 3 by F. A. Zenz presents an analysis of pressure drop and fluid velocity relation-

ships in packed beds in an unusual form intended to facilitate design calculations for, and analysis of, operating units. The usage of such terms as 'phase-diagram' for 'pressure drop—vapour velocity' diagrams and the small scale on which the diagrams are presented detract from an otherwise interesting treatment.

In chapter 4 E. J. Gohr gives a brief account of the background, history and future of fluidisation, while chapter 5 by R. M. Bruce and A. A. Fried deals with the operation of fluidisation processes. This chapter is of particular interest since it contains a critical appraisal of the effect of operating variables. The development of fluid coking is described by R. W. Krebs in chapter 6 with some operating details of particular interest to petroleum technologists. Design and control techniques in moving solids bed systems are discussed by C. Berg in chapter 7. Although much of this chapter is not strictly applicable to fluidised systems, the detailed account of control devices, flow valves, flow controllers, etc., is of considerable interest to students as well as to practising chemical engineers.

Chapter 8 by W. W. Kraft, N. Ulrick and W. O'Connor examines the significance of details in FCC units, particularly engineering design, instrumentation and operation, and contains subject matter of real value to workers concerned in the development of a fluidised technique to new problems. Finally chapter 9 contains an account by R. B. Thompson of the apparatus of fluidisation in the chemical industry with particular reference to the FluoSolids processes for roasting of pyrites and zinc sulphide and for the sizing, drying and heat treatment of solids.

Naturally much of the subject matter of chapters 3 to 8 is drawn from the fluidised cracking units of the petroleum industry but the information and discussion is of interest to workers in other fields. There are, however, serious gaps in the treatment such as, for instance, the lack of any discussion on the design or operating characteristics of cyclone separators, or the omission of a description of pilot plant equipment and methods of scaling up from pilot plant to full scale operations.

J.M.

### Nylon Ropes

A BOOKLET about nylon ropes, illustrated with photographs, has been published by British Nylon Spinners Ltd. It contains a summary of the properties such as high tensile strength, high shock resistance and great flexibility which combine to make nylon suitable for ropes. But the greater part is devoted to factual reports describing specific instances in which nylon has reduced costs, eased handling problems or increased efficiency.

## MONDAY 12 NOVEMBER

**RIC (London Section)**

London: Woolwich Polytechnic SE18, 7.30 p.m. 'Plant Growth-Regulating Substances,' by Professor R. L. Wain.

**CS (Leeds Section)**

Leeds: Chemistry Lecture Theatre, The University, 6.30 p.m. 'Determination of Alcohol in Blood and Urine of Drunken Drivers and the Interpretation Thereof,' by Dr. D. W. Kent Jones.

**CS (Newcastle & Durham)**

Durham: Science Laboratories, The University, 5.15 p.m. 'Organic Semiconductors' by Professor D. D. Eley.

**CS (South Wales Section)**

Cardiff: Chemistry Department, University College, 5.30 p.m. 'Some Radical Reactions' by Dr. R. N. Haszeldine.

**SCI (London Section)**

London: 14 Belgrave Square SW1, 6.30 p.m. Jubilee Memorial Lecture: 'The Study of Biologically-Active Agents as a Vocation' by Professor F. Bergel.

**Institute of Metals (Scottish Section)**

Grangemouth: 2.30 p.m. Visit to works of British Hydrocarbon Chemicals Ltd.

## TUESDAY 13 NOVEMBER

**Royal Society of Arts**

London: John Adam Street, Adelphi, London WC2, 5.15 p.m. 'Chemistry and the Sugar Cane' by Professor L. F. Wiggins.

**SCI (Chemical Engineering Group)**

London: 14 Belgrave Square, London SW1, 5.30 p.m. 'The Manufacture of Phthalic Anhydride by the Fluidised-Catalyst Method' by H. L. Riley.

**Society for Analytical Chemistry**

Birmingham: The University, 7 p.m. Discussion: 'Laboratory Planning and Organisation' opened by C. L. Prior and D. Barkaway.

**Inst. of Metals (S. Wales Section)**

Swansea: Electricity Showrooms, Kingsway, 6.45 p.m. 'Fuel' by C. A. J. Plummer.

## WEDNESDAY 14 NOVEMBER

**RIC (London Section)**

London: Institute of Metals, 4 Grosvenor Gardens SW1, 6.30 p.m. Annual general meeting followed by film display.

**CS (Manchester Section)**

Manchester: College of Technology, 6.30 p.m. 'Recent X-ray Structural Determinations in Glasgow' by Professor J. M. Robertson.

**Institution of Chemical Engineers**

Birmingham: Midlands Institute, Paradise Street, 6.30 p.m. 'The Transport, Storage and Handling of Hydrochloric, Nitric and Sulphuric Acids' by Dr. H. Saenger.

**SCI (Food Group)**

Mitcham: James Pascall Ltd., 6.30 p.m. Annual conversatione.

**SAC (Biological Methods Group)**

London: 'The Feathers,' Tudor Street EC4, 6.30 p.m. Discussion: 'Biological Methods in the General Analytical Laboratory.'

**University of London**

London: School of Pharmacy, 17 Bloomsbury Square WC1, 5.30 p.m. First of two lectures on 'The Contributions of Pharmacy and Chemical Engineering to World Needs' by Brigadier-General Sir Harold Hartley.

**Institute of Fuel (NW Section)**

Manchester: Engineers' Club, Albert Square, 2.30 p.m. 'Design and Performance of Modern Gas Cleaning Equipment' by C. J. Stairmand.

**British Colour Makers' Association**

London: May Fair Hotel, 7 for 7.30 p.m. Annual Dinner.

## THURSDAY 15 NOVEMBER

**RIC (Kent Sub-Section)**

Dartford: North-West Kent College of Technology, Miskin Road, 7.30 p.m. 'Melting and Crystal Structure' by Professor A. R. Ubbelohde.

**CS (London Section)**

London: Burlington House W1, 7.30 p.m. Meeting for the reading of original papers specially arranged to commemorate the 70th birthday of Sir Ian Heilbron.

**CS (Bristol Section)**

Bristol: Senior Common Room, The University, 5.30 p.m. Social evening, jointly with RIC and SCI.

**CS (Leeds Section)**

Leeds: Chemistry Lecture Theatre, The University, 6.30 p.m. 'Tropylium' by Professor M. J. S. Dewar.

**CS (N Ireland Section)**

Belfast: The Queen's University, 7.15 p.m. 'Recent Advances in Acetylene Chemistry' by Professor R. A. Raphael.

**CS (Sheffield Section)**

Sheffield: Chemistry Lecture Theatre, The University, 7.30 p.m. 'Chemotherapeutic Research' by Dr. F. L. Rose.

**SCI (Agriculture & Microbiology Groups)**

London: 14 Belgrave Square SW1, 6.15 p.m. 'Plant Virus Diseases' by F. C. Bawden; 'Viruses Attacking Insects' by Dr. K. M. Smith.

**I.Chem.E. (Graduates & Students Section)**

Manchester: College of Science & Technology, 6.45 p.m. 'Submerged Combustion Evaporators' by J. Austin.

**Society for Analytical Chemistry**

Liverpool: ICI Metals Division, Kirkby, 2 p.m. Visit.

**University of London**

London: School of Pharmacy, 17 Bloomsbury Square WC1, 5.30 p.m. Second of two lectures on 'The Contributions of Pharmacy and Chemical Engineering to World Needs' by Brigadier-General Sir Harold Hartley.

## FRIDAY 16 NOVEMBER

**CS (Birmingham Section)**

Birmingham: Chemistry Department, The University, 4.30 p.m. 'Topology and Chemistry' by Dr. A. F. Wells.

**CS (Bristol Section)**

Bristol: Chemistry Department, The University, 5 p.m. 'Overcrowded Molecules' by Professor C. A. Coulson.

**CS (Cambridge Section)**

Cambridge: University Chemical Laboratory, Lensfield Road, 8.30 p.m. 'Solutions in Sulphuric Acid' by Dr. R. J. Gillespie.

**CS (Glasgow Section)**

Glasgow: Chemistry Department, The University, 7.15 p.m. 'The Hydrogen Isotope Effect in Reaction Kinetics' by R. P. Bell.

**CS (Newcastle & Durham)**

Newcastle-upon-Tyne: Chemistry Building, King's College, 5.30 p.m. Bedson Club Lecture: 'The Chemistry of Some Naturally Occurring Polyacetylenes' by Professor B. Lythgoe.

**CS (S Wales Section)**

Swansea: Chemistry Department, University College, 6 p.m. 'Some Recent Developments in Inorganic Stereochemistry' by Professor R. S. Nyholm.

## CANADIAN CHEMICAL EXPANSION

### Outpacing Growth of General Industry by Wide Margin

BY 1975 it is estimated that the Canadian chemical industry could represent a \$4,000 million market in the country. The chemical industry is outpacing the growth of general industry by a wide margin.

The \$4,000 million figure was given by Mr. J. A. Davis, manager of the chemical department of du Pont of Canada, before the annual meeting of the Chemical Market Research Association in Quebec. Although the level was more than three times greater than the current demand, it appeared to be reasonable, he said, as *per capita* consumption would be only \$140 at that time compared to the current US *per capita* consumption of \$135.

The natural resources industries of agriculture, mining and forest products will continue to have a major impact on the demand for chemicals, said Mr. Davis. Current agricultural chemical demand amounts to \$75 million, consisting of one half fertiliser and one half pest control and food supplements. It is estimated that the agricultural demand will increase to \$200 million by 1975.

The second sector of the natural resources group, forest products, has a most important effect on chemical demand. It would appear that chemical consumption will increase faster than output of forest products as a result of new pulp cooking processes, improved brightness requirements and combinations of cellulose fibres with other materials to achieve new properties for new end uses.

Under these conditions the demand is estimated to increase from the cur-

rent \$50 million level to \$110 million in the next two decades.

Also speaking at the meeting, Mr. L. Hynes, vice-president of Canadian Industries Ltd., said: 'My conclusions will be that Canadian consumers of the heavy inorganic chemicals will continue in the future, as in the past, to be supplied largely from domestic sources. The Canadian chemical industry's rapid post-war diversification into the synthetic organics, on the other hand, is unlikely to continue at its recent rate, and a large, though slowly diminishing, proportion of the Canadian market will therefore continue to be supplied by imported chemicals in this category.'

Dr. R. S. Jane, president of Shawinigan Chemicals Ltd., declared: 'In my opinion Canadian management must exhibit more faith and confidence in the days that lie ahead than has been the case in the past in this matter of research. I realise how difficult is the decision to authorise the expenditure of relatively large sums on research and development when the risks are so great, but the alternatives are equally hazardous.'

'If we in this country require further proof of the necessity for research at this stage in our history it may be found in the annual reports of many of the successful chemical corporations in the United States and United Kingdom where it is frequently stated that more than 50 per cent of the annual income is derived from processes and products that were developed in their research laboratories in the late '30s or early '40s.'

## PLASTICS INDUSTRY IN AUSTRALIA

IT IS ESTIMATED that the 1956 value of plastics produced in Australia will exceed £26 million and amount to some 13,000 tons. According to the Australian Financial Review such a production represents more than 50 per cent of Australian plastics requirements. Expansion plans already under way will continue to reduce dependence on imported raw materials and imported articles containing plastics. The manufacture and processing of plastics in Australia is not, in the main, feasible, because of the small local market and the large scale on which chemical manufacture must be based for economic output. Costs of labour and materials are also high and prospects for plastics exports are limited. The industry is, in fact,

totally dependent on tariff protection.

Australian consumption of polythene is about 2,000 tons a year and is increasing rapidly. This plastic is not yet manufactured in Australia but a company there has announced its intention to manufacture it shortly. Ethylene gas is obtainable in Australia from alcohol produced by fermentation of molasses or from oil refining. There are several plastics, however, which Australia may not find it economic to produce for some time. Thus present imports of acrylics are of the order of 700 tons a year. Small, but increasing quantities, of nylons, epoxy resins, special celluloses, polyurethane etc., are imported, but there would be no economic grounds for their production for a long time hence.

## Spanish Projects

### Government Grants Aid Chemical Industry Build Up

EXPANSION of the chemical industry in Spain, aided by Government grants and foreign investments, is taking place. Existing capacities are being increased and new plants installed.

For instance, the Union Española de Explosivos SA of Madrid and the Sociedad Iberica de Nitrogenos intend setting up a fertiliser plant to produce 25,000 tons of nitrogen, 25,000 tons of potash and 30,000 tons of phosphate annually. Urea, calcium phosphate and potassium sulphate will also be produced.

Union Española de Explosivos, the largest concern producing superphosphate in Spain, is to increase sulphuric acid production capacity to about 105,000 tons (100 per cent  $H_2SO_4$ ) a year. At Cartagena the company expects by next year to have increased production to 185 kg. per hour of nitroglycerine destined for the manufacture of dynamite 2E and 3D.

### Liquid Carbonic Anhydride

A liquid carbonic anhydride plant will be installed by the Eulogia Dominguez Company at Creuse. It should be completed by 1958. Ahalla-Oxigeno Linde SA, Baileu, Barcelona, will increase argon production capacity to 30,000 cubic metres per year, and will also develop production of liquid oxygen, nitrogen and other gases with the aid of investments amounting to 6 million pesetas.

In the petrochemicals field, Union Quimica de Norte de España, has obtained licences to import 18,000 tons of crude petroleum for the production of ethylene, propylene, butylene and methane. This company has a production capacity of 1,500 to 3,000 tons a year for titanium dioxide.

Etino Quimica of Barcelona is already manufacturing polystyrene at Monson and will increase production of this plastic. The company is also to undertake production of p.v.c. under licence from Monsanto of America.

It is understood that Seda de Barcelona SA has interested Dutch AKU in starting production of polyamides and of synthetic fibres having polyamide bases. Initial capacity will be 1,200 tons a year.

Plans are under way for expansion of synthetic rubber plants, and to this end alcohol production was increased to 8,000 tons a year for 1955.

Lithium deposits discovered in Spain may be exploited in collaboration with a US company.

## AUTRONIC SYSTEM AVAILABLE

### All-Electronic Control for Instrumentation

NOW AVAILABLE throughout Europe and the Commonwealth (except Canada) from Elliott Brothers (London) Ltd. is the Swartwout autronic system of control. It is the first miniature all-electronic control system for process and power instrumentation and one of the most flexible in existence with its ability to use a.c., d.c., or motion inputs, as well as conventional primary elements.

Since all transmission of measurement data and transmission of control impulses is made electrically, all restrictions on location of the controller and the recorder or indicator are eliminated as well as restrictions on distance between measurement transmitter and controller, and between controller and power relays.

The complete system comprises: Primary element transmitter, recorder or indicator, controller, manual control, and power relay.

Temperature is measured by a resistance Mentrrometer connected into a fixed bridge circuit. Temperatures as low as  $-100^{\circ}\text{F}$  and up to  $1,200^{\circ}\text{F}$  can be measured with an accuracy of  $\pm\frac{1}{2}$  per cent. Special transmitters for higher temperatures such as furnace temperatures may be used. Liquid

level and flow are measured with an accuracy of  $\pm\frac{1}{2}$  per cent by a diaphragm or bellows element with very small deflection operating the core of a differential transformer, output of which is 0 to 0.500 volts a.c. for full span. Recorder, indicator and controller are easily adapted to the measurement and control of any measured variable that can be connected into a 60-cycle, a.c. voltage. The manual control panel is entirely independent of the recorder and controller.

Superiority of the autronic system over the more usual pneumatic equipment has been fully proved in many refinery and other continuous processes. High speed of response is combined with high sensitivity, ensuring that corrective action is taken immediately a process variable starts to deviate from the control point, and before the deviation is visible on the recorder or indicator. Both recorder and controller units are of plug-in design and are easily replaceable.

To ensure satisfactory maintenance of this new control equipment, Elliott Brothers (London) Ltd. will be starting shortly a special training course for service engineers.

## ZIRCONIUM CONTRACTS

ACCORDING to the Technical Information and Documents Unit of DSIR the US Atomic Energy Commission has just announced the completion of three new contracts for the supply of zirconium metal for use in nuclear reactors. The amount called for is 2,750 lb. but it is expected that this quantity will probably be increased at a later date.

For use in reactors the zirconium must be produced free from hafnium. The main process for accomplishing this is the Kroll, developed by Dr. Kroll at the US Bureau of Mines laboratory, Oregon. At least two of the contractors, National Distillers Products of Ohio, and NRC Metal Corp. of Cambridge, Massachusetts,

claim to have developed new processes which they will use in the new plants being constructed. The Carborundum Co. is extending its present plant.

The division of industrial chemistry, CSIRO, Australia, has been working on the separation of hafnium from zirconium for some time. A secret patent application lodged some time ago has been declassified. The Australian patent depends on the differential reduction of the halides of zirconium and hafnium and the subsequent disproportionation of the zirconium trichloride, the Kroll reduction furnace being used. It is believed that this method of separation is much cheaper than that in current use.

## Pump Control

### Aid to Tanker Loading Developed for Far East

REMOTE control equipment has been developed by Shell and the General Electric Co. by means of which a tanker moored at the end of a submarine loading cable  $3\frac{1}{2}$  miles out at sea can stop the cargo loading pumps on shore.

The equipment, which cost Malayan \$85,000 (£10,000), has been installed at Lutong refinery in Sarawak, British Borneo. The shallowness of the water prevents tankers from coming any nearer than  $3\frac{1}{2}$  miles.

As the tanker approaches the moorings a portable transmitter/receiver is taken aboard. In addition to providing a radiotelephone service with the shore terminal, this portable set can transmit on a special pump control channel. If it is necessary to stop the pumps in an emergency, the pressing of a control button on the operating panel of the portable set overrides the telephone channel and brings the pump control channel into operation.

## Terylene Uses

IT WAS ANNOUNCED at an ICI Ltd. press conference on 31 October that Terylene, produced by Fibre Division, ICI Ltd., is now being used for stockings by leading stocking manufacturers. Terylene is said to be the first important new fibre for stockings to be put on the market for nearly 20 years. Terylene yarns of any particular denier are finer than other yarns of the same denier but are more hard-wearing. In addition, they are unaffected by exposure to strong sunlight or by acid atmospheres and diesel fumes. Stockings made from Terylene appear to be more silk-like and are reported by wearers to be warmer.

## Birlec Development

A 10-YEAR development plan for Birlec Ltd., makers of dehumidification equipment, has been announced by the company. In connection with this a 34-acre site has been purchased at Aldridge, near Birmingham, and a factory of about 150,000 sq. ft. will be erected there.

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## Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur.

### Mortgages & Charges

The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages or Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an \*—followed by the date of the Summary, but such total may have been reduced.

**BRITISH ALUMINIUM CO. LTD.**, London SW.—1 October, disposition granted in implement of a Trust Deed dated 30 July 1947 etc.; charged on specified property at Kilmallie. \*£4,564,508. 22 May 1956.

**C. R. BERRETT & CO. LTD.**, London WC, manufacturers of bitumen etc.—2 October. £300 mortgage, to Arunlex Property Co. Ltd.; charged on land at Wishford Road, Water Ditchampton.

### Increases of Capital

**SELANGOR OIL PALM CO. LTD.** (13,026), 46 Charlotte Square, Edinburgh 2, increased by £76,240, in £1 shares, beyond the registered capital of £83,760.

**FLOORLIFE & CHEMICALS LTD.** (400,976), 62-3 Fenchurch Street, London EC3, increased by £1,500, in £1 ordinary shares, beyond the registered capital of £1,000.

### Change of Name

**MELVO LTD.**, manufacturing drug-gists, etc., Ogden Lane, Openshaw, Manchester 11, changed to Ogston & Tennant (Aberdeen) Ltd. on 1 October 1956.

## New Registrations

### J. J. McMahon Ltd.

Private company. (573,723). Registered 1 November. Capital £4,000 in £1 shares. Objects: To carry on the business of wholesale, retail, manufacturing, pharmaceutical, analytical and dispensing chemists and druggists, etc. The permanent directors are: Joseph J. McMahon, 15 Willow Grove, Wallsend; James Sherlock, 1 Woodhead Road, Walker; and Francis P. Sherlock, 20 Links Avenue, Whitley Bay. Secretary: P. Cooper. Solicitors: Waugh Moody & Mulcahy, Newcastle-on-Tyne. Registered office: 5 Higham Place, Newcastle-on-Tyne.

### Hoechst Pharmaceuticals Ltd.

Private company. (573,687). Registered 1 November. Capital £10,000 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in drugs, medicines, etc. The subscribers (each with one share) are: Frederic T. Horne and Allan D. M. Phillips, both solicitors, of 2 Bedford Row, London WC1. The first directors are not named. Solicitors: Iliffe Sweet & Co., 2 Bedford Row, London WC1.

## COMPANY NEWS

### Wiggins Teape & Co. (1919) Ltd.

Group profit of Wiggins Teape & Co. (1919), paper makers, for half-year ended 30 June 1956, after providing for debenture interest but before taxation, amounts to £2,373,477. This compares with £2,675,535 (after adjusting proportion of increased charge in obsolescence for 1955) and £2,257,681 for the similar periods of 1955 and 1954 respectively. Interim dividend is being maintained at five per cent on the £8,231,870 ordinary in respect of the year 1956. Despite the lower half-year profits, the board forecasts that the 17½ per cent distribution for 1955 will be repeated.

## MARKET REPORTS

**LONDON** Buying interest in the industrial chemicals market has been pretty well maintained during the past week and contract deliveries also continue at a steady level. So far as prices are concerned sulphate of copper has increased to £97 10s per ton less two per cent f.o.b. Liverpool from 2 November and there has been an increase in quotations for white lead and red lead which are currently quoted at £149 15s per ton and £145 per ton respectively. Export enquiry has been on a good scale although keener rates are necessary in the face of increasing competition in overseas markets. There has been a steady demand for the fertiliser materials and both cresylic acid and creosote oil have been in active request.

**MANCHESTER** The Egyptian situation, so far as the Manchester chemical market is concerned, has been reflected in a little more enquiry for forward delivery during the past week. Meanwhile, contracts in the alkalis and other leading heavy chemicals are being drawn against steadily by industrial consumers. There has been little actual movement of prices, though the general undertone seems to be rather firmer if anything. There has been a moderate aggregate movement of fertiliser materials, with a continued steady call for most of the light and heavy tar products.

**GLASGOW** Since the last report the Scottish heavy chemical market has remained more or less unchanged. Demand during the past week has continued steady, and business generally has been satisfactory in regard to spot and contract deliveries. No important price changes have taken place; on the whole prices have remained firm. The usual enquiries are being received for export, and the market is fairly active.

### WILL

**MR. HAROLD LEWIS, F.R.I.C., M.I.Chem.E.**, of 19 Langley Avenue, Surbiton, Surrey, formerly of Church Lane, Cheshunt, Herts, secretary of Du Pont Co. (United Kingdom) Ltd., who died on 19 May last, left £17,972 5s 2d gross, £10,972 5s 9d net.



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### Incidental information

No. 10

items of interest  
from our laboratory  
notebooks



Metal indicators have contributed much to the application of Sequestric Acid (EDTA), and H. & W. have made a series of these indicators available. 1-(2-Pyridylazo)-2-naphthol, for example, is used as an indicator in the titration of zinc, copper, and cadmium with Sequestric Acid in the presence of the alkaline earth metals. It is listed under H. & W. Code 7275.3. A description of the methods will be found in a paper by K. L. Cheng and R. H. Bray. *Anal. Chem.*, 27, 782 (1955).

Tetrabromophenolphthalein ethyl ester (potassium salt) is an indicator that has been put to a novel purpose. Its exceptionally great 'protein error' affords a method for the detection of proteins. See F. Feigl, *Spot Tests*, Vol. 2, p. 293. Elsevier Publishing Company (1954). The indicator has recently become available under H. & W. Code 8439.

4-Methylnioxime is the latest reagent for nickel and palladium (see Banks & Hooker, *Anal. Chem.*, 28, 79 (1956)). Nioxime itself has excellent sensitivity for nickel (1 in 10,000,000) but has its shortcomings as a gravimetric reagent. The newcomer is equally sensitive and can be used as a straightforward gravimetric reagent. It can be used in aqueous solution (about 0.3 per cent.). Now listed by H. & W. under Code 5753.

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## SITUATIONS VACANT

**CHEMIST.** A vacancy exists for a young Graduate in Chemistry as Assistant to the Chief Chemist at a large factory in E.10 area. The work involves the development of insulating enamels and varnishes, and offers a most interesting and progressive career to men or women of ability. Please send full details to Personnel Officer, **BOX No. C.A. 3509, THE CHEMICAL AGE, 154, FLEET STREET, LONDON, E.C.4.**

**TECHNICAL SERVICE.** A chemist with industrial experience, age 25-32 is required for interesting development work with rapidly growing London company manufacturing wide range of products based on oils, bitumens, natural and synthetic rubbers, vinyl resins etc. The successful applicant will be responsible to the Chief Chemist but will work in close contact with important customers and will be based on the Research Laboratory. Emphasis on experimental ability. Attractive salary. Apply will full details of qualifications and experience to **BOX NO. C.A. 3508 THE CHEMICAL AGE, 154, FLEET STREET, LONDON, E.C.4.**

## OFFICIAL APPOINTMENTS

### COUNTY BOROUGH OF BRIGHTON WATERWORKS DEPARTMENT

#### ASSISTANT CHEMIST AND BACTERIOLOGIST (MALE OR FEMALE)

Applicant should possess either Degree in Chemistry or A.R.I.C. Waterworks experience desirable but not essential. Salary Grade A.P.T. III (£640-£767).

Appointment superannuable subject to medical examination terminable by one month's notice on either side.

Application forms from Waterworks Engineer, 12 Bond Street, Brighton.

W. O. DODD, Town Clerk, BRIGHTON  
19th October, 1956.

### NORTH WESTERN GAS BOARD MANCHESTER GROUP

#### Chemist—Rochdale Road Works

Applications are invited for the above pensionable appointment at a salary within Grade A.P.T.7 (£670-£750 p.a.).

Applicants must be experienced in carrying out routine laboratory tests and be able to exercise chemical control of gas manufacturing and product processes. Applicants should possess suitable technical qualifications and gas works experience would be an advantage.

Detailed applications, giving names of two referees, should reach the General Manager, N.W.G.B., Manchester Group Town Hall, Manchester, 2, within 14 days.

## OFFICIAL APPOINTMENTS: continued

### UNIVERSITY OF DURHAM KING'S COLLEGE, NEWCASTLE-UPON-TYNE Lecturer in Chemical Engineering

The Council of King's College invite applications for a Lectureship in Chemical Engineering. Applicants should preferably hold a degree in Chemical Engineering, Chemistry, or Engineering.

The initial salary will be fixed at a suitable point on the scale £650×£50—£1,350 in accordance with the qualifications and experience of the successful applicant. Family Allowance and F.S.S.U. Duties to commence early in 1957.

Twelve copies of application, together with the names of three persons to whom reference may be made, should be submitted not later than 17th December, 1956, to the undersigned from whom further particulars may be obtained.

G. R. HANSON,  
Registrar of King's College.

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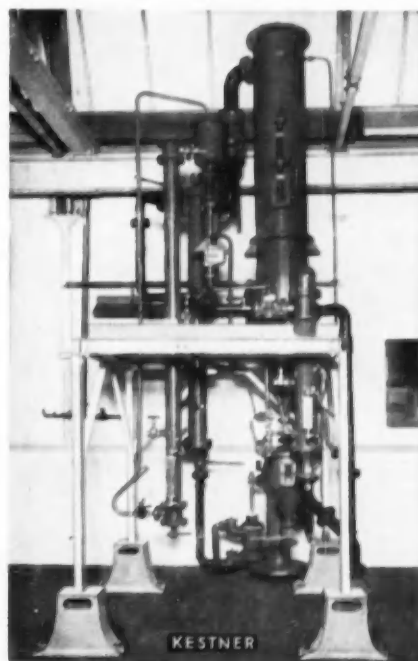
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